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GEOLOGY AND PALEONTOLOGY.

Relations of Devonian and Carboniferous Faunæ.—Prof. H. S. Williams calls attention to the recurrence of Devonian fossils in strata of Carboniferous age in northwestern Arkansas. The fossils occur in a limestone formation, about the equivalent of the Warsaw or St. Louis formations of Missouri, and referred to the lower third of the Carboniferous. Among the undoubted carboniferous forms occur numerous specimens of *Liorhynchus quadricostatum* Vanuxem and *Productella lachrymosa* var. *stigmata*, *onusta*, etc., Hall. The entire fauna is closely allied to that of the Eureka District, Nevada, and of Shasta County, California, and the author accounts for the appearance of these Devonian species in the Arkansas Carboniferous rocks as a case of migration from the region where they had been living unchanged. This migration was brought about by an elevation of the western area sufficient to cause a diversion of ocean currents and the shifting of such species as endured the transport into the Mississippi Valley.

In conclusion, Prof. Williams points out that during late Devonian and early Carboniferous time in the Appalachian province, diversity and alteration of deposits is marked by numerous successive and distinct faunas, in the western continental province uniformity of prevailing calcareous sedimentation for long periods is marked by an abnormally long continuance of many of the Devonian species, while the central continental province, midway between the two, is marked by the recurrence of Devonian species far up in the midst of Carboniferous sediments. This series of observations is confirmatory of the hypothesis that persistence of species without modification is associated with continuance of uniformity of conditions of environment, and that change in the successive faunas of geological time is associated with the change and rearrangement of the conditions of environment to which the fauna is subjected. (Am. Journ. Sci., Feb., 1895.)

Characters of Glossopteris.—A fortunate discovery of a specimen of Glossopteris, a fossil plant associated with the coal-bearing rocks of the southern hemisphere, near Mudgee, N. S. W., shows the attachment of the fronds to the caudex, bringing to light the following facts:

The leaves were successively developed along the whole course of the stalk and were deciduous. They were both petiolate and sessile.

The leaf scars were ovo-rhomboidal, and to each there appear to have been three bundles of vessels.

In consequence of this discovery, Mr. Etheridge reviews the history and structure of *Glossopteris*, giving its range in Australia, and points out its relation to allied genera. (*Proceeds. Linn. Soc. N. S. W.*, Vol. ix, 1894.).

Geological History of the West Indies.—Mr. Charles T. Simpson gives a brief history of the West Indian archipelago since Eocene times, basing it upon a study of the molluscan fauna of that region. He premises his remarks with the statement that a considerable portion of the land snail fauna of the Greater Antilles seems to be ancient and to have developed on the islands where it is now found, while that of the Lesser Antilles has resulted from migration mostly from South America. The distribution of the terrestrial and fluvial molluscan fauna is carefully worked out and presented in tabular form. From the facts collated the author deduces several interesting conclusions which he recapitulates in the following form.

“There appears to be good evidence of a general elevation of the Greater Antillean region, probably some time during the Eocene, after most of the more important groups of snails had come into existence, at which time the larger islands were united, and there was land connection with Central America by way of Jamaica and possibly across the Yucatan Channel, and there was then a considerable exchange of species between the two regions. At some time during this elevation there was probably a landway from Cuba across the Bahama plateau to the Floridian area, over which certain groups of Antillean land molluscs crossed. At this time it is likely that the more northern isles of the Lesser Antilles, which seem to be volcanoes of later Tertiary and Post-Pliocene date, were not yet elevated above the sea, or, if so, they have probably been submerged since. After the period of elevation there followed one of general subsidence.

“During this the island of Jamaica, as the character of its land snail fauna shows, as well as the depth of the channel between it and Haiti, was first to be isolated, then Cuba, and afterwards Haiti and Puerto Rico were separated. The connection between the Antilles and the mainland was broken, and the Bahama region, if it had been previously elevated above the sea, was submerged, the subsidence continuing until only the summits of the mountains of the four Greater Antillean islands remained above water. Then followed another period of elevation, which has lasted, no doubt, until the present time,

and the large areas of limestone uncovered (of Miocene, Pliocene and Plistocene age) in the Greater Antilles have furnished an admirable field for the groups of land snails that survived on the summits of the islands. The Bahamas have appeared above the surface of the sea, either by elevation or growth, and have been peopled by forms drifted from Cuba and Haiti, and a number of land and fresh-water species have been recently colonized in South Florida, probably since the Glacial epoch. (Proceeds. U. S. Natl. Mus., Vol. xvii, 1894.)

Fossil Mammals of the Lower Miocene White River Beds.—A part of the collection made in 1892 for the American Museum at New York by Dr. Wortman, has been made the subject of a paper by the collector in conjunction with Prof. Osborn of Columbia College. The novel points presented are :

1. New characters of the Lower Miocene Rhinoceroses, including two new types, *A. trigonodum* and *A. platycephalum*.
2. The osteology of *Metamynodon*.
3. The basioccipital characters of *Oreodon* as developed in successive horizons.
4. The determination of two species of *Anthracotherium*, and additional characters of the American *Hypopotamus*.

An important adjunct to the paper is a tabular statement of the succession of species in the White River Miocene. (Bull. Am. Mus. Nat. Hist., 1894.)

Geological News.—**ARCHEAN.**—According to Prof. H. P. Woodward, the Archean rocks are more largely developed in Western Australia than in any other portion of the world. The series is highly contorted, being folded into a number of parallel folds striking north and south. These folds form naturally six distinct belts which differ in the character of the rocks. Beginning at the west, the first belt is composed of comparatively soft rocks, intersected by dikes of diorite and granite, and veins containing lead, copper, zinc and iron. The second belt is of hard, crystalline rocks also intersected by granite dikes, and but few mineral bearing veins. The third is a granite belt, absolutely destitute of mineral veins. The fourth, fifth and sixth are rich in gold, iron and copper. (Geol. Mag. Dec., 1894.)

PALEOZOIC.—According to Mr. Walcott, the oldest Cambrian fauna known in western United States is found in the White Mountain range of Inyo County, California, where the author traced a coral

reef (*Archæocythinæ*) for nearly thirty miles. (*Am. Journ. Sci.*, Feb., 1895.)

Prof. N. H. Winchell considers the Galena limestone only a phase of the Trenton, intensified in the typical locality, and fading out in all directions. The physical break and faunal change which follow it in the northeast are the probable parallels of those which mark the transition from the Trenton to the Hudson River. (*Am. Geol.*, Jan., 1895.)

A specimen of the new fossil shark, *Cladodus clarkii*, recently found in the Cleveland shale of northern Ohio shows the dentition in a remarkable manner by reason of some fortunate fractures. The new specimen confirms most of the characters previously published, and adds a few not discoverable in former fossils. It is described and figured by Prof. Claypole. (*Am. Geol.*, Jan., 1895.)

Recent examinations of the "elephant rock," occurring in various parts of the Transvaal prove it to be a dolomite. Mr. Draper, to whom the rocks were submitted, states that this dolomite is of great extent in the Transvaal and Namaqualand, and he is of the opinion that the limestone tufa, now occupying large areas in the drainage basin of the Vaal and Orange Rivers, are derived from the dolomite. (*Quart. Journ. Geol. Soc.*, Nov., 1894.)